A NEW SUBSPECIES OF *HESPERILLA CRYPSARGYRA* (MEYRICK) (LEPIDOPTERA: HESPERIIDAE) FROM SOUTHERN QUEENSLAND AND A NEW STATUS FOR *HESPERILLA HOPSONI* WATERHOUSE

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Abstract

Hesperilla crypsargyra binna subsp. n. is described and figured from an isolated population within the Lamington National Park in southern Queensland. Characters are given to enable separation from the closely related but geographically isolated *H. c. crypsargyra* (Meyrick). The new geographical arrangement together with examination of genitalia and other characters indicate that *H. hopsoni* Waterhouse stat. n. is specifically distinct from *H. crypsargyra*. The immature stages of *H. c. binna* are recorded on *Gahnia insignis* S.T. Blake (Cyperaceae).

Introduction

Hesperilla crypsargyra (Meyrick) has a discontinuous distribution from southern Queensland to western Victoria (Braby 2000). Nominotypical *H. c. crypsargyra* occurs in central coastal New South Wales and two additional subspecies have been described. *H. c. hopsoni* Waterhouse is a distinctive montane population extending from Stanthorpe in southern Queensland (Common and Waterhouse 1981) to the Barrington Tops (Waterhouse 1927) and Mt Allyn (Muller 1991) in New South Wales. *H. c. lesouefi* Tindale was proposed for a few isolated Victorian populations (Tindale 1953), even though differences from the nominotypical population were minimal.

The discovery of additional, morphologically intermediate populations has prompted some authors to question the validity of the separation of *H. c. lesouefi* from *H. c. crypsargyra* (Dunn and Dunn 1991, Braby 2000), even though the presence of intergrades does not invalidate subspecific status under accepted definition (Torre-Bueno 1978).

During a visit by one of us (PRW) to Lamington National Park in southern Queensland, in late November 2002 (Wilson 2004), numerous small dark skippers were observed flying in an area of montane heath. These were suspected to be *H. crypsargyra*. The area was revisited in November 2003 and specimens collected to confirm their identity. They were closest in appearance to *H. c. crypsargyra* but separated from the nearest known population of that subspecies by more than 500 km.

Examination of the southern Queensland material has revealed consistent differences from *H. c. crypsargyra* and subspecific status is proposed here to define this isolated population. It occurs approximately 120 km from the northernmost population of *H. c. hopsoni* and closer examination of a range of characters from both adult and immature stages has led to the conclusion that *H. hopsoni* is specifically distinct from *H. crypsargyra*.

Hesperilla crypsargyra binna subsp. n.

(Figs 1-2, 7-8, 13, 17, 20)

Types. Holotype ♂, QUEENSLAND: Daves Creek track, Lamington National Park, 28.221S, 153.206E, em. 9.xi.2004, S.J. Johnson (in Queensland Museum, Brisbane, Reg. No. T99263). *Paratypes:* 6 ♂♂, same data as holotype but 15.xi.2003; 1 ♀, em. 14.xi.2004 (in Queensland Museum); 23 ♂♂, 2 ♀♀, same data as holotype but 15.xi.2003 (in Museum of Tropical Queensland, Townsville); 3 ♂♂, 3 ♀♀, 4 km SE Binnaburra, 28.2217S, 153.2064E, 15.xi.2003, P.R. Wilson; 1 ♂, same data but em. 18.xi.2003, P.R. Wilson (in P.R. Wilson collection); 9 ♂♂, same data as holotype but 15.xi.2003 (in P.S. Valentine collection); 14 ♂♂, 1 ♀, Daves Creek Track, Binna Burra N.P., 4.xi.2004; 10 ♂♂, 1 ♀, 20.xi.2004; 8 ♂♂, 4 ♀♀, 27.xi.2004, all C.G. Miller (in C.G. Miller collection).

Description. Male (Figs 1, 7). Average wingspan 22.7 mm (n = 74). Forewing upperside dark brown-black with slight yellow suffusion basally, a prominent orange-yellow spot in cell, 3 subapical spots, a median band of 2 spots between M_3 and CuA_2 a thin, wavy sex brand extending from M_3 to inner margin and a faint subterminal band. Forewing underside brown-black with yellow costal streak, spots as above and a faint pale streak along inner margin. Hindwing upperside dark brown-black with median band of 2 wedge-shaped spots between M_3 and CuA_2 and, rarely, an additional small spot anterior to 1A+2A; termen chequered. Hindwing underside brown-black with yellow suffusion along veins, a small wedge-shaped silver spot in cell, an additional submedian silver spot anterior to Rs, a median band of 3 prominent silver spots joined by a silver stripe along 1A+2A to subterminal band of 5 silver spots; termen chequered.

Female (Figs 2, 8). Average wingspan 24.4 mm (n = 12). Upperside similar to male but termen more rounded, with additional median and post median spots and subterminal band more pronounced. Underside similar to male.

Male genitalia (Fig. 17). Vinculum slightly sigmoid-shaped; tegumen sloping posteriorly to rounded, hirsute, beak-like uncus, deflexed posteriorly; gnathos with 2 oval sclerotised spinose patches; valva tapering to a point anteriorly and slightly expanded distally; ampulla serrated and sloping posteriorly; harpe strongly sclerotised with serrate upcurved tip lying flush with ampulla; aedeagus expanded posteriorly and tapering to a narrow, rounded tip anteriorly; juxta with lateral ovoid sclerotised bodies.

Etymology. Binna is the local aboriginal dialect word for the southern cliffs.

Comments. All populations of *H. crypsargyra* show variation in adult size but adults of *H. c. binna* are more uniform and consistently smaller than those of *H. c. crypsargyra* (Table 1). Average wingspan of *H. c. binna* is 22.7 mm (n = 74) for males and 24.4 mm (n = 12) for females, compared with 25.42 mm (n = 97) and 27.13 mm (n = 50) respectively for *H. c. crypsargyra*. The postmedian band on the forewing upperside is reduced in *H. c. binna*, being represented by three patches between Rs and M_3 and, in occasional

specimens, with a vestigal patch anterior to CuA_1, whereas all *H. c. crypsargyra* examined had 5-6 patches extending to CuA_2 or 1A+2A (see Figs 1-4). On the hindwing underside all specimens of *H. c. binna* have an uninterrupted silver stripe along the anal vein joining the median and subterminal silver patches, whereas most specimens (84%) of *H. c. crypsargyra* have this stripe interrupted. *H. c. binna* have much less yellow scaling basally anterior to $Sc+R_1$ and Rs compared with *H. c. crypsargyra* (see Figs 7-10).

Tindale (1953) proposed *H. c. lesouefi* on the basis of reduced size, darker ground colour and reduced segments in the postmedian band of the hindwing. Examination of a large series from throughout Victoria and southern New South Wales has shown no differences from *H. c. crypsargyra* in the colour of the forewings or in the number of segments in the hindwing postmedian band (see Table 2). However, specimens from southern NSW and eastern Victoria are consistently smaller than those from the Blue Mountains area (see Table 1) and are better placed in *H. c. lesouefi*.

Table 1. Wingspan measurements of *Hesperilla crypsargyra* populations.

Location	males	n	females	n
Southern Qld	22.7 mm	74	24.41 mm	12
Blue Mtns, NSW	25.42 mm	97	27.13 mm	50
Victoria	23.66 mm	80	25.41 mm	62
Southern NSW	24.70 mm	10	26.25 mm	4

Table 2. Segments in hindwing postmedian band of *H. crypsargyra* populations.

Taxon	Range	Average	n
Southern Qld.	2-5	3.2	86
Blue Mtns, NSW	4-6	5.72	87
Victoria	4-6	5.85	142
Southern NSW	4-6	5.85	14

Host plant. The host plant at Lamington National Park is *Gahnia insignis* S.T. Blake (Cyperaceae), growing in an area of montane heath overlying rhyolite/trachyte pavement (Fig. 16). This is a fine, soft-leaved plant with a scrambling habit. A search of the Queensland Herbarium database has shown a restricted distribution in Queensland, occurring at only 4-5 sites in the southeast and on Hinchinbrook Island near Ingham in the north. There are records from Whian Whian State Forest and near Lismore in northern NSW but no search for additional locations in that State has been undertaken.

Several large stands of *G. insignis* occur as an understorey plant in wet eucalypt forest but not overlying rhyolite or trachyte rock. No adults or signs

of larval feeding have been found in these situations, despite some being within 5 km of the Daves Creek site. We have produced a composite map of known records of *G. insignis* together with vegetation and soil types and only three sites showed host plant growing on rhyolite/trachyte rock pavement. The remaining two of these sites are inaccessible but both lie within protected areas and future surveys of these sites are recommended to search for additional populations.

H. c. crypsargyra and *H. c. lesouefi* feed exclusively on *G. microstachya* and *H. hopsoni* feeds on *G. sieberiana* and *G. grandis* (Braby 2000).

Biology. Voltinism and flight period remain unknown at this stage. Adults are common in November but visits to the site in December 2002 (SJJ) and March 2004 (C.G. Miller pers. comm.) failed to locate adults. A search for immature stages has yielded only pupae in early November and early instar larvae in late December, which further suggests that the species is univoltine with a restricted flight period.

Hesperilla hopsoni Waterhouse, stat. n.

(Figs 5-6, 11-12, 15, 19, 22)

Hesperilla crypsargyra hopsoni Waterhouse, 1927: 282.

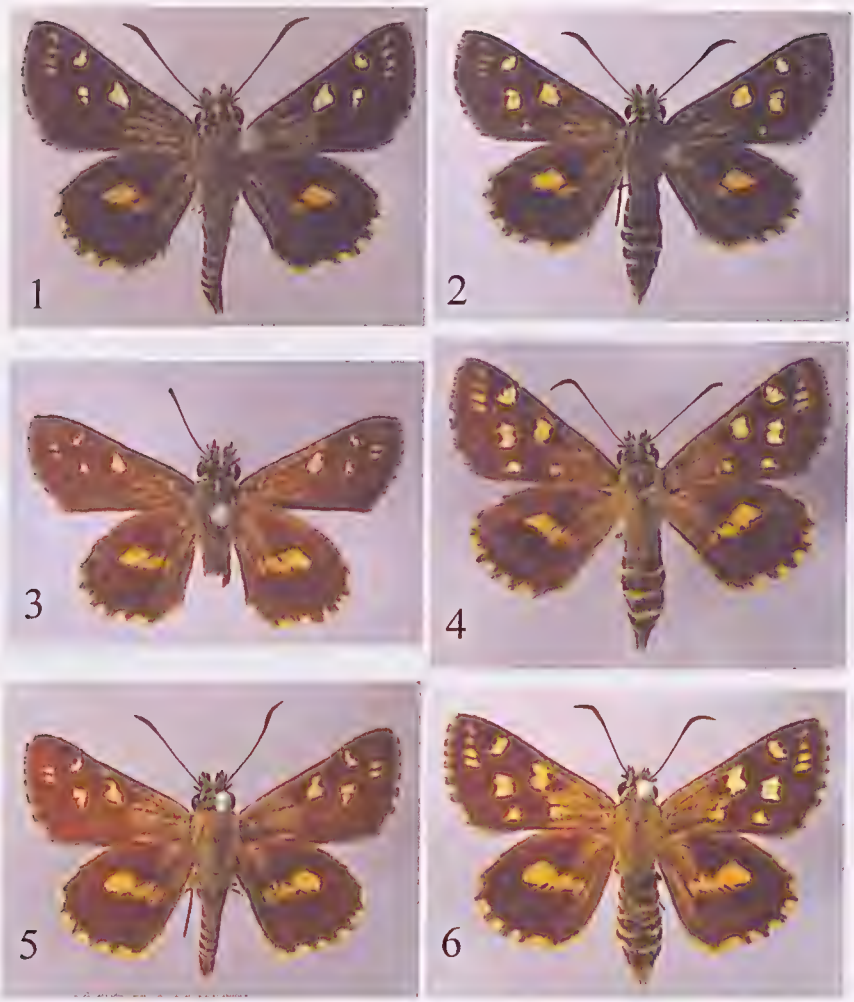
Material examined. 25 ♂♂, 25 ♀♀, (in Australian National Iinsect Collection, Canberra, Museum of Tropical Queensland and Queensland Museum).

Description. An adequate description was given by Waterhouse (1927).

Comments. The historical site for *H. hopsoni* at Mt Norman, near Stanthorpe in SE Qld, is 120 km from the Lamington Plateau location of *H. c. binna*, although at a higher altitude. Specimens from this site have been confirmed as *H. hopsoni* by Ted Edwards (pers. comm.), indicating that this population is an extreme northern extension of the montane *H. hopsoni* and not an extension of the Lamington National Park population of *H. c. binna*.

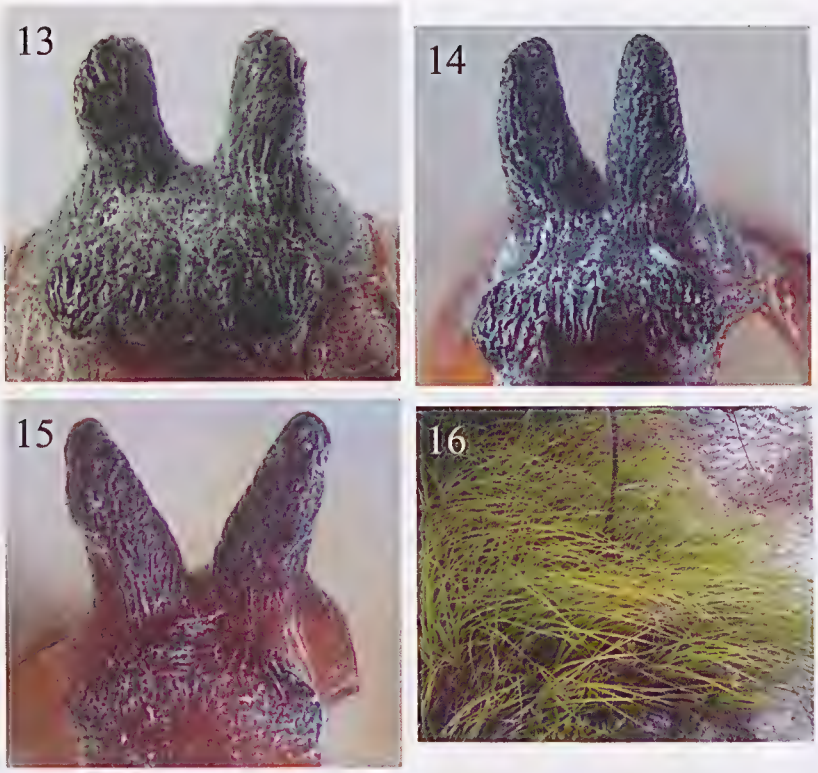
H. hopsoni is substantially larger than *H. crypsargyra*, with an average wingspan of 30 mm in males and 32 mm in females, compared with 26.6 mm and 30.1 mm for *H. c. crypsargyra* and 22.7 mm and 24.4 mm for *H. c. binna* respectively. As noted by Waterhouse (1927), the underside forewing colour in *H. hopsoni* is brown, compared with red-brown in *H. c. crypsargyra*, while the spots are orange rather than yellow and there is a broad orange streak along the upper edge of the cell. On the hindwing the veins are orange and the silver spots are much larger.

The following differences are present in the male genitalia of the three taxa (see Figs 17-19): the tegumen of *H. hopsoni* is shorter and has a more angular dorsum than the others; in the valvae, the serrate ampulla of *H. c. binna* arises gradually anteriorly, whereas those of *H. c. crypsargyra* and *H. hopsoni* arise acutely; the spinose patches on the gnathos are smaller and more angular in *H. hopsoni* and the ampulla of *H. c. crypsargyra* is more serrate.



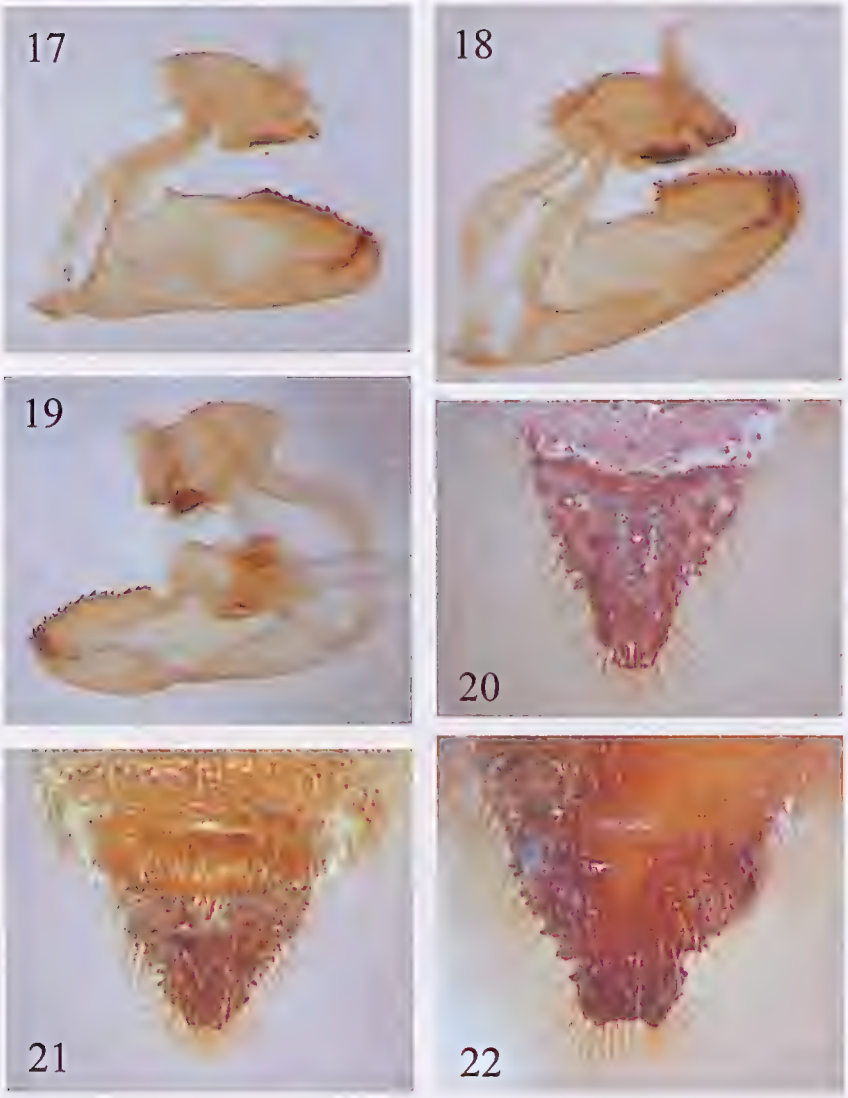
Figs 1-6. *Hesperilla* spp., uppersides. (1) *H. crypsargyra binna* subsp. n., holotype male; (2) *H. c. binna* subsp. n., paratype female; (3) *H. c. crypsargyra* male; (4) *H. c. crypsargyra* female; (5) *H. hopsoni* male; (6) *H. hopsoni* female.

Figs 7-12. *Hesperilla* spp., undersides. (7) *H. crypsargyra binna* subsp. n., holotype male; (8) *H. c. binna* subsp. n., paratype female; (9) *H. c. crypsargyra* male; (10) *H. c. crypsargyra* female; (11) *H. hopsoni* male; (12) *H. hopsoni* female.



Figs 13-16. Pupal caps of *Hesperilla* spp. and host plant of *H. c. binna* subsp. n. (13-15) Pupal caps: (13) *H. crypsargyra binna* subsp.n.; (14) *H. c. crypsargyra*; (15) *H. hopsoni*. (16) *Gahnia insignis* growing in an area of exposed rhyolyte at Lamington National Park, SE Qld.

The egg of *H. c. crypsargyra* has 27-29 vertical ribs (Grund 1998), whereas that of *H. hopsoni* has 47 ribs (Braby 2000). *H. c. crypsargyra* and *H. c. binna* each appear to be restricted to a single host plant with relatively small leaves and have not adapted to widespread, larger-leaved forms used by *H. hopsoni* and other *Hesperilla* Hewitson species. Pupal opercula have been regarded as diagnostic within *Hesperilla* species (Grund 1998) and the projections of *H. c. binna* are approximately half the length of those of *H. c. crypsargyra* and *H. hopsoni*. The projections of the pupal operculum of *H. hopsoni* are more divergent than those of *H. c. crypsargyra* (see Figs 13-15). The cremaster of *H. hopsoni* has a deeper dorsal concavity and broader tip than that of *H. c. crypsargyra* and that of *H. c. binna* is more elongated than those of the other two taxa (see Figs 20-22).



Figs 17-22. Male genitalia and pupal cremasters of *Hesperilla* spp. (17-19) Male genitalia: (17) *H. crypsargyra binna* subsp. n.; (18) *H. c. crypsargyra*; (19) *H. hopsoni*. (20-22) Pupal cremasters: (20) *H. c. binna* subsp. n.; (21) *H. c. crypsargyra*; (22) *H. hopsoni*.

The numerous differences between the three taxa suggest that they have been geographically and genetically isolated for sufficient time to permit speciation to occur. However, the similar morphologies of *H. c. binna* and *H. c. crypsargyra* indicate subspecific status. A more detailed understanding of phylogenetic relationships must await genetic analyses.

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